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33. Studies on the Mechanism of the Action of Analgesics. (I)

On the Action of Anesthetics and Analgesics upon the Electrophysiological Phenomenon of the Brain

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Derbyshire reported previously about a special electrical response in the brain cortex caused by the stimulation of the sciatic nerve. It can be readily imagined that this response should be related with the sense of pain. In order to clarify the nature of this relation the influence of various anesthetics, analgesics and local anesthetics upon the electrical response was studied, using a cathodray oscillograph and C.R.-coupled amplifier. For inducing the electrical current from the brain, a silverchloride electrode placed on sensorimotor cortices or the hypothalamus was used. Animals used in the experiments were rabbits and cats.

Results:

In the electroencephalogram of unanesthetized animals a special large excursion was always observed shortly after the stimulation of the sciatic as well as the median nerve, as Derbyshire described. This excursion faded away, when animals were anesthetized with various anesthetics (or hypnotics), as ether, chloral hydrate, urethan, myanesine, while barbiturate derivatives as amytal, dial, luminal, evipan and pentothal sodium did not exert such action but they facilitated the revelation of this response, though other excursion became small and curves were levelled. When narcosis with barbiturate was so deep that the base line of the electroencephalogram found itself quite smooth, a small excursion, preceded the large one was manifested. In experiments with cats morphine caused the similar action as ether etc. in abolishing the large excursion. (For this experiment rabbits were found to be unsuitable because the animal exhibited great resistance against morphine). Electrical response of the brain mentioned above was not proved in animals which were spinal anesthetized with various local anesthetics as procaine, cocaine, percamin. Ether, chloral hydrate, myanesine, procaine, cocaine and morphine antagonized the action of barbiturates. Central stimulants as strychnine, camphor, coeffeine as well as pelvitine were ineffective in reproducing the large excursion abolished by ether.